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ABSTRACT

The Systematic Curriculum and Instructional Development (SCID) model provides a tested procedure for developing high-quality, low-cost competency-based education and tech prep curriculum and instructional materials. It consists of 5 phases--analysis, design, development, implementation, and evaluation--and 23 components. The analysis phase includes needs, job, and task analyses. In the design phase, the task performance information collected during analysis is used to determine a training approach and develop learning objectives, performance measures, and a training plan. The development phase results in the production of whatever instructional materials, including media, were decided upon during the design phase. In competency- and performance-based programs, the instructional materials typically take the form of competency profiles, learning guides, and modules. The more traditional education and training programs usually produce curriculum guides, courses of study, and lesson plans. Implementation involves putting the education or training program into actual operation. The training is conducted, and learner performance is evaluated. Results of instruction are documented in the form of student and instructor performance records. Summative evaluation data is collected and analyzed; corrective actions are initiated. (Attachments include graphic and descriptive information about the model.) (YLB)

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# SCID: MODEL FOR EFFECTIVE INSTRUCTIONAL DEVELOPMENT

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# SCID: MODEL FOR EFFECTIVE INSTRUCTIONAL DEVELOPMENT

by
Robert E. Norton

The development of curriculum and instructional materials for CBE and Tech Prep is a costly and complex process involving many critical tasks. The failure to properly carry out anyone of these tasks can jeopardize the entire instructional development effort. The importance of the process demands that appropriate and effective procedures be used so as to guarantee the production of relevant, high quality materials. Further, the high costs involved require that the most efficient time and money saving approaches available be utilized.

To provide some structure to this very important process, an efficient and effective model has been devised. Known as SCID or the Systematic Curriculum and Instructional Development model, it consists of five phases and 23 components. The five-phases are (1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation. Each of the 23 components involves several steps, some optional but most required. Educational and business/ industry use of the SCID model todate has shown it to be very practical and workable. See Attachments A and B for some graphic and descriptive information about the model.

## Analysis Phase

Analysis is where it all begins. The needs analysis component of this phase is where the actual need or needs are determined by conducting practical and applied research. The need may be a need for training, for a change in management or production procedures, for new equipment, updated technology, or a combination of these. If the need for training is confirmed then some type of job analysis is called for. While the observation and interview techniques used to be extensively used to conduct job analysis, today we strongly recommend the DACUM approach to job analysis because of its many benefits and advantages over all other approaches for most situations.

Following the job analysis procedure, we highly recommend that task verification be conducted. Task verification can serve several important purposes. To describe two of them, verification can extend the involvement of a few persons in the job analysis to 50, 100 or more expert workers and/or immediate supervisors of the workers. It can also provide and opportunity to obtain valuable decision-making information such as a rating on the "importance" of each task and a rating regarding the "difficulty of learning to perform" each task.

Given the information available from task verification, we are in a good position to select or deselect, as some industry trainers say, the tasks to be included in the education or training program. We also have valuable information which can guide both the instructional development and instructional planning process.

Last but not least, we are ready to conduct standard task analysis. Task analysis can take many forms but, properly done, will yield the explicit and detailed information that is needed to develop relevant and technically accurate learning guides, modules, and other types of teacher and student materials. The task analysis of the selected tasks will serve to identify the steps involved in their performance, the knowledge and attitudes required for successful performance, the performance standards expected by industry, the decisions the worker must make during task performance, etc. Task analysis also provides the information needed by the teachers and instructors who want to seriously integrate the vocational and academic instruction provided. Such information, obtained from expert workers, is critical to successful curriculum and instructional development. See Attachment C for a sample analysis.

**Design Phase**

In the design phase, the task performance information collected during analysis is used to specify, in measurable terms, the job skills, knowledge, and attitudes the education or training program will develop in the learner. Decisions are also made about the type of instructional program to be developed; a fully competency-based one, a Tech Prep program, a more traditional one, or perhaps something in between. Decisions also need to be made about the amount of

individualization of instruction to be offered, the amount and type of supportive media to be developed, and the type of student and teacher instructional materials to be produced.

Measurable learning objectives are developed for each task or group of clustered tasks. Job performance measures, sometimes called JPMs are developed for each task. Written tests and performance checklists are developed so as to allow for valid and reliable assessment of the learner's achievement.

During this phase decisions are also made regarding the training setting or settings most appropriate, student/trainee entry-level qualifications, and the sequencing of learning objectives. The design phase concludes with the preparation of a training plan. The training plan will include information about such things as: (a) the selection and recruitment of learners, (b) the selection and/or training of faculty, (c) instructional facility needs, and (d) the tool, equipment, supplies, and materials needed. The implementation of the training plan begins upon its completion so that the necessary preparations can be made concurrently with the development phase.

**Development Phase**

The development phase results in the production of whatever instructional materials, including media were decided upon during the design phase. The materials must be developed so as to help the learners achieve the performance objectives in the most efficient, effective, and economical way possible. Emphasis should be on maximizing the use of existing materials and resources whenever possible. Often good materials exist which can be readily adapted. Teacher/instructor and student/trainee activities are designed using the learning objectives and performance measures developed during the design phase as a foundation to guide the process.

In competency and performance-based programs, the instructional materials typically take the form of competency profiles, learning guides, and/or modules. The more traditional education and training programs usually produce curriculum guides, courses of study, and lesson plans.

Whatever the type of materials being produced, it is usually most advisable to produce some type of media. The type of media to be developed will depend on many factors including the resources available, the nature of the learning, the skills of the developers, and the equipment and time available. Some media such as overhead transparencies, posters, and 35mm slides are quite easily produced at low cost. Other media such as videotapes and interactive videodiscs require more skills and time and are more expensive to produce. The production of appropriate media is strongly encouraged as they can add variety and clarity to the instructional process, serve to motivate the learner, and facilitate the explanation of complex and difficult to explain concepts and procedures.

The instructional materials produced should be reviewed for technical accuracy, edited, tried out with a group of learners, and revised as necessary. The pilot-testing and revision of newly developed materials is very important and should not be short changed for the sake of saving a little time or a few dollars. A field review or critique by qualified persons may sometimes be substituted for the actual pilot or field-testing by students/trainees.

**Implementation**

Implementation involves putting the education or training program into actual operation. Work begins by activating the training plan developed in the design phase. Learners have been recruited, instructors selected and trained, and the availability of facilities, supplies, equipment, and other resources is confirmed.

After pretesting, the training is conducted as planned and learner performance is evaluated with both progress and posttests. Instructor performance is also assessed. The evaluations serve to verify that the learners have achieved the performance objectives and to identify any instructor performance problems that need to be remedied. Formative evaluation data is collected from the students and the instructor and used to make in-course corrections as necessary. The results of instruction are documented in the form of student and instructor

performance records. Student competency achievement profiles are used to report to parents, students, employers, and concerned others.

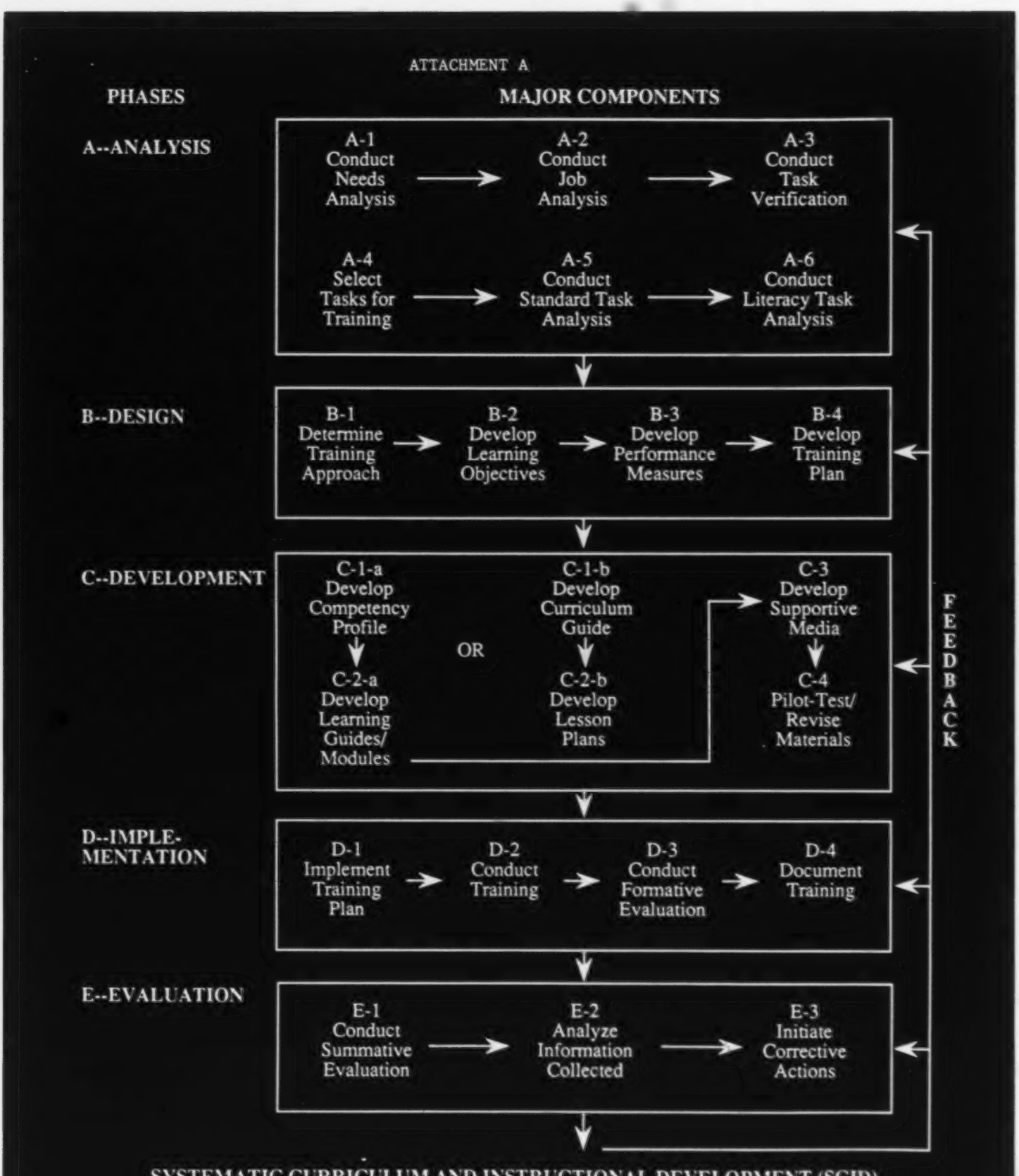
### Evaluation Phase

While formative evaluation was conducted during the course of the instruction, it is extremely important at this juncture to conduct summative evaluation. By gathering data on the overall instructional process, on the program outcomes, student follow-up data, worker productivity data, and cost-effectiveness data; evaluation can generate decision-making data to help maintain and improve the education or training program. The summative data collected must be carefully and appropriately analyzed and interpreted. Recommendations regarding the program improvements needed then are made and decision-makers are encouraged to take any necessary corrective actions. Completing the evaluation phase produces the performance data and feedback vital to any education and/or training system concerned with quality management or justifying its existence to management.

### Summary

Need high quality materials for training tomorrow's workforce today? The SCID model provides a tested procedure for developing high-quality, low-cost CBE and Tech Prep curriculum and instructional materials.

ATTACHMENT A




SYSTEMATIC CURRICULUM AND INSTRUCTIONAL DEVELOPMENT (SCID)

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ATTACHMENT B

SCID

SYSTEMS APPROACH SUMMARY

| Phases | Major Activities | Outcomes | Major Product |
|---|---|---|---|
| Analysis | • Conduct Needs Analysis<br>- Identify job needs<br>- Identify company needs<br>- Identify trainee needs<br>• Conduct Job Analysis<br>- Identify job/task duties<br>- Verify job tasks<br>- Select tasks for training<br>• Conduct Task Analysis<br>- Identify steps<br>- Identify knowledge needed<br>- Identify basic skills needed<br>- Identify safety factors<br>- Identify standards<br>- Identify worker decisions<br>- Identify other needed data | • General Needs Identified<br><br>• DACUM Chart or Duty and Task List<br>• Task Verification Data<br>• Tasks to be Included in Training Program<br>• Instructional Requirements for Each Task Including Specific Performance Standards | Training Program Performance Standards |
| Design | • Determine Training Approach<br>- Specify program design<br>- Specify training settings<br>• Develop Learning Objectives<br><br>• Develop Performance Measures<br>- Skill assessment<br>- Attitude assessment<br>- Knowledge assessment<br>• Develop Training Program Specifications<br>- Facility needs<br>- Equipment needs<br>- Staffing needs | • Specification of Program Design and Training Settings<br><br>• Sequenced Terminal and Enabling Objectives<br>• Testing Specifications and Measures for Knowledge, Skill, and Attitude Assessment<br><br>• Description of Facility, Equipment, Staffing, and other Program Specifications | Curriculum Design Specifications |
| Development | • Develop Competency Profile<br>• Develop Trainee Materials<br>• Develop Supportive Media<br>• Develop Teacher/Student Learning Guide(s)<br>• Pilot-Test/Revise Materials | • Competency Profile<br>• Modules or Learning Guides<br>• Supportive Media<br>• Teacher/Student Learning Guide(s)<br><br>• Field Tested Materials | Instructional Materials<br>- Competency Profile<br>- Teacher's Guide<br>- Learning Guides<br>- Audiovisual Materials |
| Implementation | • Implement Training Plan<br>- Recruit/Select trainees<br>- Orient and train staff<br>- Secure needed facilities<br>- Schedule instruction<br>• Conduct Training<br>• Conduct Formative Evaluation<br>• Document Training Results | •Students/Trainees<br>• Appropriate Facilities<br>• Required Equipment<br>• Training Schedule<br>• Trained Students/Workers<br>• Program Improvement Data<br>• Trainee Achievement Data | Competent Trainees/ Workers<br><br>Training Program Achievement and Improvement Report |
| Evaluation | • Conduct Summative Evaluation<br>- Process data collection<br>- Product data collection<br>- Follow-up data collection<br>- Cost data assembled<br>• Analyze Information Collected<br>- Compile data<br>- Interpret data<br>• Initiate Corrective Actions | • Summative Data<br>- Process feedback<br>- Product feedback<br>- Follow-up data<br>- Program cost data<br>• Description of Program Improvements Needed<br>• Program Improvement Plan<br>- Specific recommendations | Program Evaluation and Improvement Plan |

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## TASK ANALYSIS FORM

Duty: MAINTAIN THE HOME YARD

Expert Workers: _____

| Steps | Performance Standards | Tools, Equipment, Materials, & Supplies |
|---|---|---|
| 1. Remove mower from storage | | 1. Mower |
| 2. a. Check/add oil<br>b. Check/add gas | 2. a. 1. Checked oil level<br>2. Added correct amount of oil, if needed<br>b. 1. Checked gas level<br>2. Filled gas tank, if needed | 2. a. 1. Rag or paper towel<br>2. Correct type oil<br>b. 1. Measure<br>2. Correct type gas |
| 3. a. Check/adjust cutting height<br>b. Attach bagger | 3. a. Adjusted mower to desired cutting height<br>b. Attached bagger unit, if desired | 3. a. 1. Ruler<br>2. Owner's Manual<br>b. 1. Bagger unit |
| 4. Start mower | 4. Choked engine, if cold<br>Adjusted idle to recommended setting<br>Started engine quickly | 4. Owner's Manual |
| 5. Determine mowing pattern | 5. Mowed lawn in pattern requested<br>Mowed all the lawn | 5. |
| 6. Operate the mower safely | 6. Operated mower safely by:<br>a. wearing proper clothing<br>b. removing any objects from lawn<br>c. keeping children & animals a safe distance<br>d. proceeding at safe speed for conditions | 6. |
| 7. Dispose of clippings | 7. Properly disposed of clippings | 7. Containers for clippings |
| 8. Shut off mower | 8. Turned off engine and prepared it for storage | 8. Broom or gags |
| 9. Return mower to storage | 9. Returned mower to storage area | 9. |
| 10. Collect mowing fee (if appropriate) | 10. Collected appropriate fee for services | 10. |

Task: MOW THE LAWN

Recorder: Robert E. Norton Date: 2/20/93

| Related Knowledge | Safety | Attitudes |
|---|---|---|
| | 1. Do not damage car or other items | 1. Cautious and careful |
| 2. a.1. Location of oil level measure<br>2. Ability to read oil level measure<br>b.1. Location of gas tank<br>2. Ability to determine gas level<br>Type of gasoline appropriate, or gas/oil mixture ratio | 2. a. 1.Be careful not to spill or waste oil<br>2. Be careful not to overfill engine<br>b. 1. Be careful not to spill gasoline<br>2. Avoid sparks or touching hot surfaces | 2. Cautious and careful |
| 3. a. Read ruler/owner's manual<br>b. Ability to attach bagger unit | 3. Avoid cuts | 3. Concern for quality |
| 4. Basic principles of engine operation<br>Location and operation of choke and throttle<br>Ability to crank engine properly | 4. Locate on flat surface free of objects | 4. Concern for safety of self & others |
| 5. Available patterns and benefits of each | 5. | 5. |
| 6. Safe lawn mowing procedures<br>Danger to people and animals<br>What objects constitute danger | 6. Watch for safety of children, other adults, animals | 6. Safety conscious |
| 7. Clipping disposal options | 7. | 7. |
| 8. Location of off-switch<br>Appropriate cleaning procedure | 8. Avoid touching hot surface | 8. Safety conscious |
| 9. Ability to store mower safely | 9. Avoid damage to mower and adjacent objects | 9. Safety conscious |
| 10. Calculation of correct mowing fee | | 10. Courteous, appreciative |

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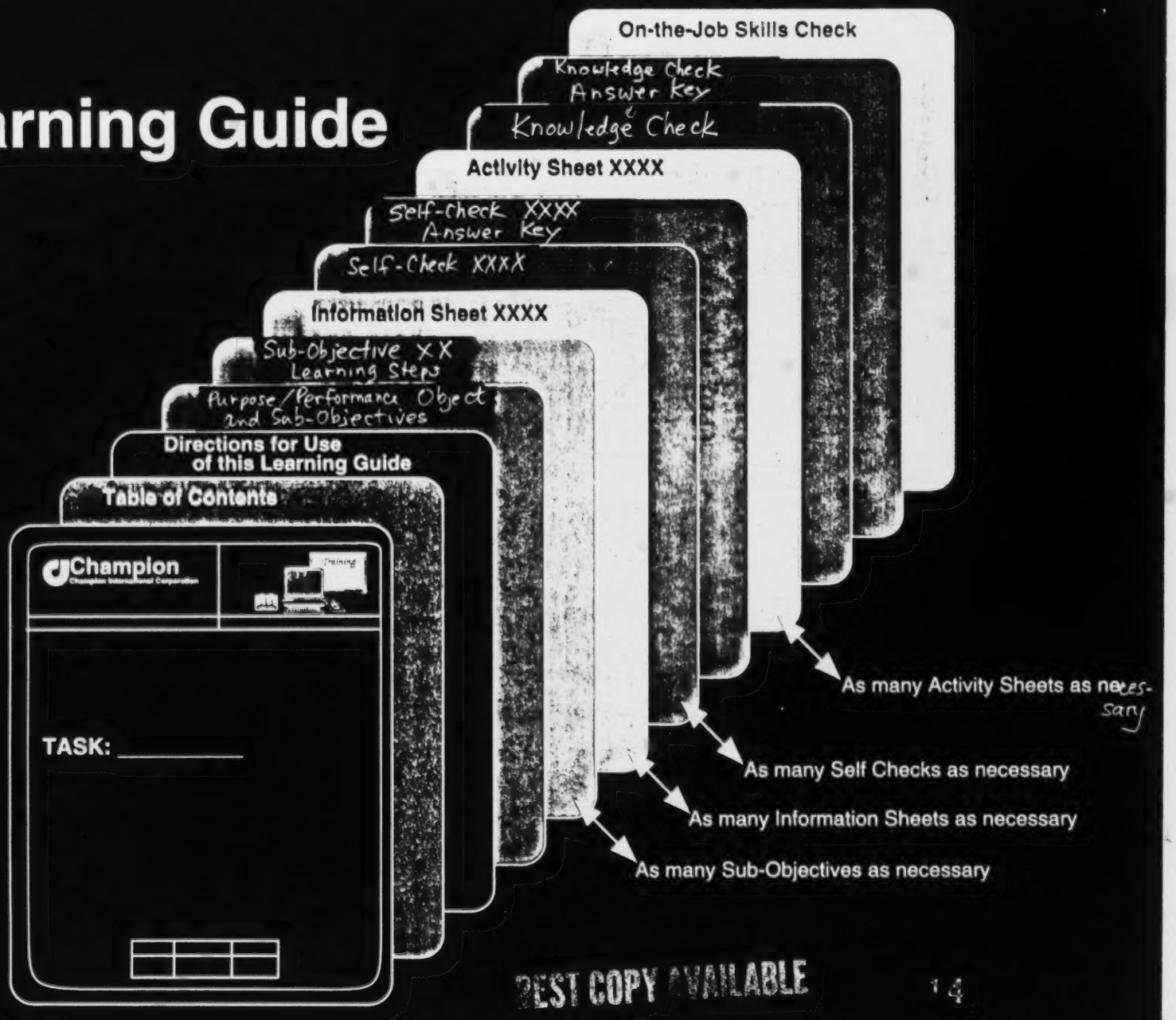
| DECISIONS | CUES | ERRORS |
|---|---|---|
| **Identify Decisions that Must be Made** | **Identify the Data Needed for Making Correct Decisions** | **Indicate What Will Result if Incorrect Decisions are Made** |
| 1. | 1. | 1. |
| 2.a. Whether to add oil, & if needed, the amount<br>b. Whether to add gas, and if needed, how much | 2. a. Reading from the oil dipstick<br>b. Gas gauge or other measure | 2.a. Could damage or destroy engine<br>b.1. Run out of fuel<br>2. Clog fuel system |
| 3. a. Determine best cutting height<br>b. Whether to bag clippings | 3. a. Owner's manual and customer preference<br>b. Owner preference | 3. a.1. Dissatisfied customer<br>2. Damage to lawn health<br>b. Dissatisfied customer |
| 4. Decide on amount to choke | 4. Owner's manual & condition of engine | 4. Engine won't start |
| 5. Decide on best mowing pattern | 5. Owner's manual & owner's preference | 5. Dissatisfied customer |
| 6. How to operate safely | 6. Owner's manual | 6. Loss of customer |
| 7. Determine how best to dispose of clippings | 7. Owner's preference | 7. Dissatisfied customer |
| 8. | 8. | 8. |
| 9. Decide on best storage area | 9. Owner's preference or previous location | 9. Dissatisfied customer |
| 10. Determine reasonable and correct fee | 10. Going rates in the area | 10. Worker loses money<br>Customer unhappy with excessive fee |

# Learning Guide



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